Please CANCEL claims 10, 31, 36, 46 and 48 without prejudice or disclaimer.

REMARKS

In accordance with the foregoing, claims 1, 7, 9, 11-14, 19-20, 25, 33, 35, 37-38, 45, 47 and 55 are pending and under consideration. Claim 20 has been amended to improve its form and not in response to the Office Action or otherwise to overcome prior art. Claims 10, 31, 36, 46 and 48 have been cancelled without prejudice or disclaimer. No new matter is being presented, and approval and entry are respectfully requested.

REJECTION UNDER 35 U.S.C. §103:

In the Office Action at page 2-3, the Examiner rejected claims 1, 7, 9-14, 19-20, 25, 31, 33, 35-38 and 45-48 under 35 U.S.C. §103 in view of either Maeda et al. (U.S. Patent No. 6,069,870) or Horikiri (U.S. Patent No. 5,537,373). The rejection is traversed and reconsideration is requested for the following reasons.

The Examiner cited either Horikiri or Maeda et al. for disclosing "an optical recording and reproducing apparatus comprising a disk having wobbled land and grooves therein, where each of the land or groove is out of phase with the land/groove, and each of the groove/land is in phase with the land/groove (as illustrated by Fig. 1A of Horikiri and Fig. 2 of Maeda et al.), a wobbling signal detector (photo detection means elements 9-10, Fig. 1B of Horikiri and element 33, Fig. 5A of Maeda et al.), a wobbling signal determining means to determine either the light is tracking a land track or a groove track (Fig. 1B of Horikiri and Fig. 19 of Maeda et al.), and tracking controller to track either track." In addition, with respect to the dependent claims drawn to wobbled grooves and wobbled lands that are in and out of phase with each other, the Examiner cited either reference for showing "the use of an out of phase first area (land or groove) and in phase second area (land or groove)." With respect to the dependent claims drawn to the address information (header) positioned at a boundary line between the land and

groove track, the Examiner cited such a feature as being well established in the art as shown by Applicant's own prior art Fig. 1 and Fig. 7A of Maeda et al. Finally, with respect to the dependent claims drawn to the signal processing to determine whether the light beam is tracking a land or groove track, the Examiner cited such a feature in Figs. 1B and 2B of Horikiri and Figs. 4, 12 and 16 of Maeda et al.

First, the Applicant respectfully notes that Horikiri or Maeda et al. does not disclose a recording medium where " the wobble of groove tracks or individual land tracks are a first type of track which are out of phase with the wobbles of the next other type of track by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks," as recited in claim 1, and similarly claimed in 13, 19, 35, 38 and 45.

With respect to Fig. 2 of Maeda et al., the Examiner mistakenly notes "in and out phase land and grooves." Instead, Maeda et al. discloses a wobbled groove (inner boarder 14), either with a waveform "0" or "1" that is out of phase with a next wobbled land (outer border 15) either with another waveform "0" or "1" *by π/2*. Applicant notes that whether the wobbled groove has the waveform "0" or "1" and/or wobbled land with "0" or "1," the wobbled groove is not *in phase* with the wobbled land.

Applicant respectfully draws the Examiner's attention to Figs. 3 and 27 of Maeda et al., which better details Maeda et al.'s disclosure. Figs. 3 and 27 show a partial cross-sectional view of a recording medium with grooves 270 and 272, and lands 269, 271 and 273 that are wobbled so as to have a wobbled groove 14 of the groove 270 that is out of phase with a next wobbled land 15 of the land 271 by π/2, which is out of phase with a next wobbled groove 14 of the groove 272 by π/2, and so on... Therefore, contrary to the assertion of the Examiner, Maeda et al. does not disclose or suggest a recording medium having wobbled groove/land tracks that are out of phase with next wobbled land/groove tracks by a predetermined phase difference, *which is in phase* with following wobbled groove/land tracks.

With respect to Horikiri, the Applicant notes that Horikiri discloses a recording medium having address information recorded as a change in waveform of a groove track. This waveform, a wobbled groove, is read by using a main-spot laser beam or sub-spot laser beams. Specifically, when the main-spot is reading the data *from the groove track*, wobbles of the grove track having the address information are also read. Instead, when the main-spot is reading the data from the land track, *again, wobbles of the groove track* are read using one of the two sub-spots. Accordingly, while wobbles are shared by both a grove and a land track, arrangements of wobble waveforms with respect to the land track in Horikiri are arbitrary and lack function as "it is not possible to obtain a wobble signal from the push-pull signal because the waveforms on both sides of the land are different." Col. 3, lines 7-13. Fig. 1A cited by the Examiner further illustrates the arbitrary arrangement of the wobbles with respect to the land track (from left to right, note the arrangement of the last land track and the wobbled groove track), resulting in a random phase difference when the wobbled groove track is out of phase with the "wobbled" land track. Therefore, Horikiri does not disclose or suggest a recording medium having wobbled groove/land tracks that are out of phase with next wobbled land/groove tracks *by a predetermined phase difference*, which is in phase with following wobbled groove/land tracks so as to serve objects of the Applicant's invention.

Accordingly, Horikiri or Maeda et al. does not disclose or suggest a recording medium having wobbled groove and land tracks where " the wobble of groove tracks or individual land tracks are a first type of track which are out of phase with the wobbles of the next other type of track by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks," as recited in claim 1, and similarly claimed in 13, 19, 35, 38, and 45. As disclosed in page 10, lines 22-25 of the Applicant's specification, "since the phases of wobbles of individual groove tracks and individual land tracks are altered (i.e., resulting from the in and out of phase of the wobbles, as shown in Fig. 5), it is possible to discriminate whether the groove track or land track number is an odd number or an

even number, thereby ensuring addressing." Furthermore, with the in and out of phase of the wobbles, it is possible to more accurately determine the type of track that is being picked up.

For example, Figure 5 of the specification shows wobbles of individual groove tracks that are out of phase by a predetermined phase (π for example) with respect to wobbles of next land tracks, and wobbles individual land tracks that are in phase with wobbles of next groove tracks. Accordingly, as shown in Figures 6A and 6B, only a groove wobble signal has an AC component (sinusoidal signal) while a land wobble signal has only a DC component in a first channel CH1, and only a land wobble signal has an AC component while a groove wobble signal has only a DC component in a second channel CH2. As such, it is possible to more accurately determine the type of a track that is currently being picked up based on whether the signal of CH1 and CH2 is an AC or a DC signal, so as to more effectively perform the servo control. On the other hand, Maeda et al. discloses wobbled groove and land tracks that are out of phase to each other by $\pi/2$. Therefore, it is difficult to accurately determine whether a track being picked up is a groove track or a land track because a land wobble signal being picked up will have a variable magnitude of a AC component due to noise. Finally, with the in and out of phase of the wobbles of the present invention, it is possible to determine whether a track being picked up is either a groove track or a land track without additional pit signals.

Second, the Applicant respectfully notes that Horikiri or Maeda et al. does not disclose a recording medium having wobbled groove and land tracks where "the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks, and...have a phase difference of π..." as recited in claim 9, 11 and 12, and similarly claimed in 13, 19, 35, 38, and 45.

With respect to Horikiri's disclosure, the Applicant has already shown that arrangements of wobble waveforms with respect to the land track are arbitrary and lack function, resulting in a random phase difference when wobbles of groove/land tracks are out of phase with wobbles of land/groove tracks. In fact, the last wobbled groove track shown in Fig. 1A of Horikiri clearly

shows that wobbles of the land track are not out of phase with wobbles of the groove track by π.

Maeda et al. discloses a recording medium having a wobbled groove/land track that is out of phase with a next wobbled land/groove track by π/2, which is out of phase with a next wobbled groove/land track by π/2, and so on... Column 7, line 33 to column 8, line 29 and column 9, line 21 to column 10, line 55 of Maeda et al. discloses the importance of the π/2 relationship. Specifically, this orthogonal relationship between wobbles of groove/land tracks to wobbles of land/groove tracks is used with reference signals generated for the wobbled groove and land tracks in a detailed multiplication and integration process to detect address information represented by the wobbling waveforms. In other words, an apparatus and a method of recording/reproducing data, including the address information, according to Maeda et al. dictates a recording medium with wobbled groove tracks that are out of phase with wobbled land tracks *by π/2*.

Accordingly, Horikiri or Maeda et al. does not disclose or suggest a recording medium having wobbled groove and land tracks where "the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks, *and...have a phase difference of π...*" as recited in claim 9, 11 and 12, and similarly claimed in 13, 19, 35, 38, and 45 of Applicant's invention.

Third, the Applicant respectfully notes that Horikiri or Maeda et al. does not disclose an optical disk recording and/or reproducing apparatus, a servo controller, and a servo controlling method for a recording medium having "wobbles of the groove tracks or the land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks by π..." as recited in claims 35 and 38, 13, and 19 and 45, respectively. With the wobble arrangements of the present

invention, more accurate track type information can be picked up, resulting in more effective servo control as the sign of a servo signal is different based on the type of a track.

In addition, contrary to the Examiner's assertion, Horikiri or Maeda et al. does not disclose "a wobbling signal detector to detect a wobble signal from at least one of the two channels; a wobbling signal determiner to determine whether one of the track...is a groove track or a land track *based on the at least one wobble signa*l, and to provide a determination signal; and a controller...for controlling a servo for moving the pickup unit using the determination signal and the detected wobble signal," as recited in claims 13-14, 19-20 and similarly claimed in 35, 37-38, 45 and 47.

As an initial matter, the Applicant has already shown that Horikiri or Maeda et al. does not disclose or suggest a recording medium having "wobbles of the groove tracks or the land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks *by a predetermined phase difference* and the wobbles of the other type of tracks are *in phase* with the wobbles of the next first type of tracks," or where "the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks *by* π..."

While the Examiner has correctly identified "photo detection means elements 9-10 of (Figs. 1B and 2B) of Horikiri," which detect a wobble signal, the Applicant has shown that these elements are only used to detect a wobble signal from a groove track *and not* from the groove *and* a land track. Furthermore, the Examiner mistakenly cites that it is used with "a wobbling signal determining means to determine either the light is tracking a land track or a groove track and tracking controller to track either track." Horikiri discloses using a wobbled groove track for determining address information. However, Horikiri does not disclose or suggest using the wobbled groove track and a wobbled land track to determine whether elements 9-10 are tracking a groove track or a land track. Instead, Horikiri uses changes in polarity of a tracking error signal where a tracking error signal for the groove "is opposite in phase to a tracking error signal for controlling the main-spot to be at the center of the land, because the land is higher than the

groove." Col 2, lines 54-65 and Col 3, lines 9-17. In other words, Horikiri uses the height difference of the groove track and the land track to determine whether the elements 9-10 are tracking the groove track or the land track.

On the other hand, while Maeda et al. discloses using a photo detector to detect wobbles of both a groove track and a land track, it uses a different and more detailed approach to determine whether a currently picked up track is either a groove track or a land track.

In the Applicant's invention, a wobble signal detector detects "a wobble signal from at least one of the two channels" and "a wobbling signal determiner to determine whether one of the track...is a groove track or a land track *based on the at least one wobble signal*." In other words, because of the arrangement of the Applicant's recording medium in which wobbles of a first type of tracks are out of phase with the wobbles of a next other type of tracks *by a predetermined phase difference* and the wobbles of the other type of tracks are *in phase* with the wobbles of the next first type of tracks, *or* wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks *by* π, it is possible to determine whether a current track is a grove track or a land track simply based on the at least one wobble signal using the channels that either supplies sum or difference of the two wobble signals. For example, in response to a recording medium having wobbled groove tracks that are out of phase with wobbled land tracks *by a predetermined phase difference* and the wobbled land tracks *in phase* with next wobbled groove tracks, a wobble signal determiner of the Applicant's invention determines that *a wobble signal* is in a groove track if it is detected from a first channel. Instead, if *a wobble signal* is detected from a second channel, the wobble signal determiner determines that the wobble signal is in a land track.

However, Maeda et al. discloses a recording medium with wobbles of groove and land tracks having an orthogonal relationship (out of phase with each other by 90°) throughout the tracks. In accordance with such arrangement, multiple bits of wobbled waveforms of groove and land tracks are read, processed, and then confirmed so as to determine whether the

combination of multiple bits of the wobbled waveforms of the grove track and the multiple bits of the wobbled waveforms of the land track produce *a predetermined arrangement of bits.* Based on this predetermined arrangement of bits, a determination is made as to whether a currently picked up track is either a groove track or a land track. To better illustrate this, the Applicant respectfully draws the Examiner's attention to Fig. 3 and column 7, line 33 to column 8, line 29 of Maeda et al. instead of the Examiner's citation of Figs. 4, 12, 16 and 19 of Maeda et al. Fig. 3 shows that wobbled grooves 14 and wobbled lands 15 are separated into 3 bits each. The combined waveform of the wobbled groove 14 of a groove track 270 represents data "011." The combined waveform of the wobbled land 15 of a land track 271 represents data "101." After processing all this information, using a combination of the arrangement of the bits, "a combination of "011" and "101," it can be confirmed that the track irradiated by the reproducing beam spot 1 is the groove track 270." Col 8, lines 19-21. Similarly, "so long as address information 13 which is detected is a combination of "101" and "110," it can be known that the reproducing beam spot 1 is shifted to the land track side..." Col 8, lines 24-27.

Therefore, Maeda et al. does not disclose or suggest "a wobbling signal detector to detect a wobble signal from at least one of the two channels; a wobbling signal determiner to determine whether one of the track...is a groove track or a land track *based on the at least one wobble signal*, and to provide a determination signal; and a controller...for controlling a servo for moving the pickup unit using the determination signal and the detected wobble signal," as recited in claims 13-14, 19-20 and similarly claimed in 35, 37-38, 45 and 47.

Finally, the Applicant respectfully notes that claims 11, 25 and 33, and new claim 55 are drawn to physical identifier headers positioned *at centers of groove and land tracks*, and such a factor is not disclosed or suggested by the Applicant's own disclosure and Fig. 7A of Maeda et al. As the Examiner correctly cited but mistakenly applied to the Applicant's claims, the Applicant's own prior art and Fig. 7A of Maeda et al. disclose headers "positioned *at a boundary line between the land and groove tracks.*" With a conventional recording medium with headers

located a half a track pitch from the center of a groove or land track, position control depending on beam shift and light intensity are different between formation of the groove track and formation of the header in one beam mastering. Even in two-beam mastering, additional tilt correction methods must be adopted because it is difficult to precisely control beam position and light intensity since reproduction characteristics of the headers in the groove track and in the land track are different from each other. However, with headers positioned at centers of groove and land tracks, "beam refraction is not necessary during mastering, nor is it necessary to use two beams. Even if two beams are used, the beam intensity only has to controlled, but position control does not necessarily have to be controlled." Page 8, lines 2-6.

CONCLUSION:

In accordance with foregoing, it is respectfully submitted that all outstanding rejection have been overcome and that all pending claims patentably distinguish over the prior art.

There being no further outstanding objections or rejections, it is submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

STAAS & HALSEY LLP

Date: 1/28/02

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Please AMEND claims 1, 9, 13, 19-20, 25, 35, 38, and 45 in accordance with the following:

1. (ONCE AMENDED) A recording medium comprising:

land tracks; and

groove tracks;

wherein the land tracks and the groove tracks are wobbled, and the wobbles of groove tracks or individual land tracks are a first type of tracks which are out of phase with the wobbles of the next other type of tracks by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks.

9. (ONCE AMENDED) A recording medium [groove tracks] comprising:

land tracks; and

groove tracks;

wherein

the land tracks and the groove tracks are wobbled, [and]

the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks, and

the wobbles formed of the land tracks and the groove tracks have a phase difference of π with the wobbles of the next other types of tracks.

13. (ONCE AMENDED) A servo controller in an optical recording and/or reproducing apparatus having a pickup unit for tracking an optical recording medium having groove tracks and land tracks, the servo controller comprising:

a photo detector to output as two channels a light signal reflected from the optical recording medium in which wobbles of the groove tracks or the land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the

next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks by π;

a wobble signal detector to detect a wobble signal from at least one of the two channels;

a wobble signal determiner to determine whether one of the tracks, which is currently tracked by the pickup unit, is a groove track or a land track based on the at least one wobble signal, and to provide a determination signal; and

a controller to generate a control signal for controlling a servo for moving the pickup unit using the determination signal and the detected wobble signal.

19. (ONCE AMENDED) A servo controlling method for an optical recording and/or reproducing apparatus having a pickup unit for tracking an optical recording medium, comprising:

[(a)] outputting as two channels a light signal reflected from the optical recording medium in which wobbles of groove tracks or land tracks of the recording medium which are a first type of track are out of phase with the wobbles of the next other type of tracks by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks by π;

[(b)] detecting a wobble signal from at least one of the two channels;

[(c)] determining whether one of the tracks which is currently tracked by the pickup unit, is a groove track or a land track based on the at least one wobble signal to provide a determination signal; and

[(d)] controlling a servo for moving the pickup unit using the determination signal and the detected wobble signal.

20. (ONCE AMENDED) The method according to claim 19, wherein the detecting of the wobble signal comprises [if the wobbles of the land tracks and the groove tracks are out of phase with the wobbles of the next other types of tracks, in the step (b),] detecting a groove wobble signal and a land wobble signal from a first one of the two channels corresponding to a sum of two signals output from the photo detector in response to the wobbles of the land tracks and the groove tracks being out of phase with the wobbles of the next other types of tracks, the detected groove wobble signal and the land wobble signal being out of phase with respect to each other.

25. (ONCE AMENDED) A recording medium comprising:

land tracks; [and]

groove tracks; and

physical identifier headers formed in centers of the land and groove tracks, respectively;

wherein the land tracks and groove tracks are wobbled, and the groove tracks have a same frequency as and are out of phase with the land tracks.

35. (ONCE AMENDED) An optical recording and/or reproducing apparatus having a pickup for tracking an optical recording medium and a servo to move the pickup, comprising:

a photo detector to output two signals in response to a light signal reflected from the optical recording medium in which wobbles of the groove tracks or the land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks by π[having land tracks and groove tracks, wherein the land tracks and groove tracks are wobbled, and the groove tracks have a same frequency as and are out of phase with the land tracks]; and

a servo control unit to determine a wobble signal from the two signals, and in response, generate a control signal to move the servo, wherein the servo control unit comprises:[.]

a wobble signal detector to detect the wobble signal from the two signals,

a wobble signal determiner to determine whether one of the tracks, which is currently tracked by the pickup, is a groove track or a land track based on the wobble signal, to generate a determination signal, and

a controller to generate the control signal based upon the wobble signal and the determination signal.

38. (ONCE AMENDED) An optical recording and/or reproducing apparatus having a pickup for tracking an optical recording medium and a servo to move the pickup, comprising:

a photo detector to output two signals in each of two channels in response to a light signal reflected from the optical recording medium in which wobbles of the groove tracks or the land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks by π[having land tracks and groove tracks, wherein the land tracks and groove tracks are wobbled, and the groove tracks have a same frequency as and are out of phase with the land tracks]; and

a servo control unit to determine at least one wobble signal from at least one of the two channels, respectively, and in response, generate a control signal to move the servo, wherein the servo control unit comprises:[.]

a wobble signal detector to detect the at least one wobble signal from the at least one of the two channels,

a wobble signal determiner to determine whether one of the tracks, which is currently tracked by the pickup, is a groove track or a land track based on the at least one wobble signal, to generate a determination signal, and

a controller to generate the control signal based upon the at least one wobble signal and the determination signal.

45. (ONCE AMENDED) A servo controlling method for an optical recording and/or reproducing apparatus having a pickup for tracking a recording medium, the servo controlling method comprising:

outputting two signals in response to a light signal reflected from the optical recording medium in which wobbles of the groove tracks or the land tracks which are a first type of tracks are out of phase with the wobbles of the next other type of tracks by a predetermined phase difference and the wobbles of the other type of tracks are in phase with the wobbles of the next first type of tracks, or the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks by π[having land tracks and groove tracks, wherein the land tracks and groove tracks are wobbled, and the groove tracks have a same frequency as and are out of phase with the land tracks]; and

determining a wobble signal from two signals, and in response, generating a control signal to move the servo, wherein the determining of the wobble signal comprises:[.]

detecting the wobble signal from the two signals,

determining whether one of the tracks, which is currently tracked by the pickup, is a groove track or a land track based on the wobble signal, to generate a determination signal, and

generating the control signal based upon the wobble signal and the determination signal.

Please ADD the following NEW claim 55:

55. A recording medium comprising:

land tracks;

groove tracks; and

physical identifier headers which store track numbers and sector numbers and are prepitted in centers of corresponding ones of the land tracks and groove tracks;

wherein the land tracks and the groove tracks are wobbled, and the wobbles of the groove tracks and the land tracks are out of phase with the wobbles of the next other types of tracks.

Please CANCEL claims 10, 31, 36, 46 and 48 without prejudice or disclaimer.